

Listing of the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-20. (Canceled)

21. (Previously Presented) An apparatus configured to clean an assembled irradiated nuclear fuel assembly having multiple fuel rods, the apparatus comprising:

an elongated housing having an opening at a first end and a length, wherein said opening is configured to receive, and said length is configured to be at least as long as, said assembled irradiated nuclear fuel assembly; and

a plurality of ultrasonic omnidirectional transducers positioned on said housing, each comprising:

a first end;

a second end; and

a rod disposed between said first end and said second end, said rod configured to emanate omnidirectional ultrasonic energy waves;

wherein said first end and said second end are attached to said elongated housing.

22. (Canceled)

23. (Canceled)

24. (Previously Presented) The apparatus of claim 21, wherein said plurality of ultrasonic omnidirectional transducers is positioned along the entire length of said housing.

25. (Previously Presented) The apparatus of claim 21, wherein said rod of each of said plurality of ultrasonic omnidirectional transducers comprises an elongated rod positioned substantially parallel to the length of said housing.

26. (Previously Presented) The apparatus of claim 25, wherein said plurality of ultrasonic omnidirectional transducers is positioned along the entire length of said housing.

27-28. (Canceled)

29. (Previously Presented) The apparatus of claim 21, wherein said housing is configured to receive an irradiated boiling water reactor nuclear fuel assembly.

30. (Previously Presented) The apparatus of claim 21, wherein said elongated housing further comprises a reflector that comprises:

a cylindrical inner reflecting surface positioned around a periphery of said housing; and

a cylindrical outer reflecting surface positioned around a periphery of said cylindrical inner reflecting surface and forming a gap between said cylindrical inner reflecting surface and said cylindrical outer reflecting surface.

31. (Previously Presented) An apparatus configured to clean an assembled irradiated nuclear fuel assembly having multiple fuel rods, the apparatus comprising:

an elongated housing configured to receive said assembled irradiated nuclear fuel assembly; and

a plurality of ultrasonic omnidirectional transducers positioned on said elongated housing, each comprising:

a first end;

a second end; and

a rod disposed between said first end and said second end, said rod configured to emanate omnidirectional ultrasonic energy waves having a node structure that is an approximate multiple of a spacing between the fuel rods of said assembled irradiated nuclear fuel assembly;

wherein said first end and said second end are attached to said elongated housing.

32. (Previously Presented) The apparatus of claim 31, wherein said approximate multiple is one.

33. (Previously Presented) The apparatus of claim 31, wherein said elongated housing further comprises a reflector that comprises:

a cylindrical inner reflecting surface positioned around a periphery of said elongated housing; and

a cylindrical outer reflecting surface positioned around a periphery of said cylindrical inner reflecting surface and forming an air gap between said cylindrical inner reflecting surface and said outer reflecting surface.

34. (Previously Presented) An apparatus configured to clean an assembled, four-side irradiated nuclear fuel assembly having multiple fuel rods, the apparatus comprising:

- an elongated housing to receive said assembled irradiated nuclear fuel assembly;

- a plurality of ultrasonic omnidirectional transducers, wherein each comprises a rod configured to emanate omnidirectional ultrasonic energy waves and further wherein:

- a first subset of said plurality of ultrasonic omnidirectional transducers is positioned on said elongated housing and configured to be adjacent to a first side of said assembled irradiated nuclear fuel assembly;

- a second subset of said plurality of ultrasonic omnidirectional transducers is positioned on said elongated housing and configured to be adjacent to a second side of said assembled irradiated nuclear fuel assembly;

- a third subset of said plurality of ultrasonic omnidirectional transducers is positioned on said elongated housing and configured to be adjacent to a third side of said assembled irradiated nuclear fuel assembly; and

- a fourth subset of said plurality of ultrasonic omnidirectional transducers is positioned on said elongated housing and configured to be adjacent to a fourth side of said assembled irradiated nuclear fuel assembly;

wherein said elongated housing comprises a reflector comprising:

- a cylindrical inner reflecting surface positioned around a periphery of said elongated housing; and

a cylindrical outer reflecting surface positioned around a periphery of said cylindrical inner reflecting surface and forming an air gap between said cylindrical inner reflecting surface and said cylindrical outer reflecting surface.

35. (Previously Presented) The apparatus of claim 34, wherein the length of said elongated housing extends in a first direction and further wherein the length of each of said plurality of ultrasonic omnidirectional transducers is positioned substantially parallel to said first direction.

36. (Canceled)

37. (Previously Presented) An apparatus configured to clean an assembled irradiated nuclear fuel assembly having multiple fuel rods, the apparatus comprising:

a housing having a first end and a second end, wherein the housing has an opening at the first end and a length that is defined between the first end and the second end, wherein said opening is configured to receive, and said length is configured to be at least as long as, said assembled irradiated nuclear fuel assembly; and

a plurality of ultrasonic transducers positioned on said housing, each comprising a rod configured to emanate omnidirectional ultrasonic energy waves having a node structure that is an approximate multiple of a spacing between the fuel rods of said assembled irradiated nuclear fuel assembly.

38. (Previously Presented) The apparatus of claim 37, wherein said plurality of ultrasonic omnidirectional transducers is positioned along an entirety

of said length of said housing.

39. (Previously Presented) The apparatus of claim 37, wherein said approximate multiple is one.

40. (Previously Presented) The apparatus of claim 37, wherein said housing further comprising a reflector that comprises:

a cylindrical inner reflecting surface positioned around a periphery of said stationary housing; and

a cylindrical outer reflecting surface positioned around a periphery of said inner reflecting surface, in which an air gap is positioned between said inner reflecting surface and said outer reflecting surface.

41. (Previously Presented) The apparatus of claim 31, wherein each of said plurality of ultrasonic omnidirectional transducers is configured to emanate ultrasonic energy waves with a period equal to an approximate multiple of the spacing between the fuel rods of said assembled irradiated nuclear fuel assembly.